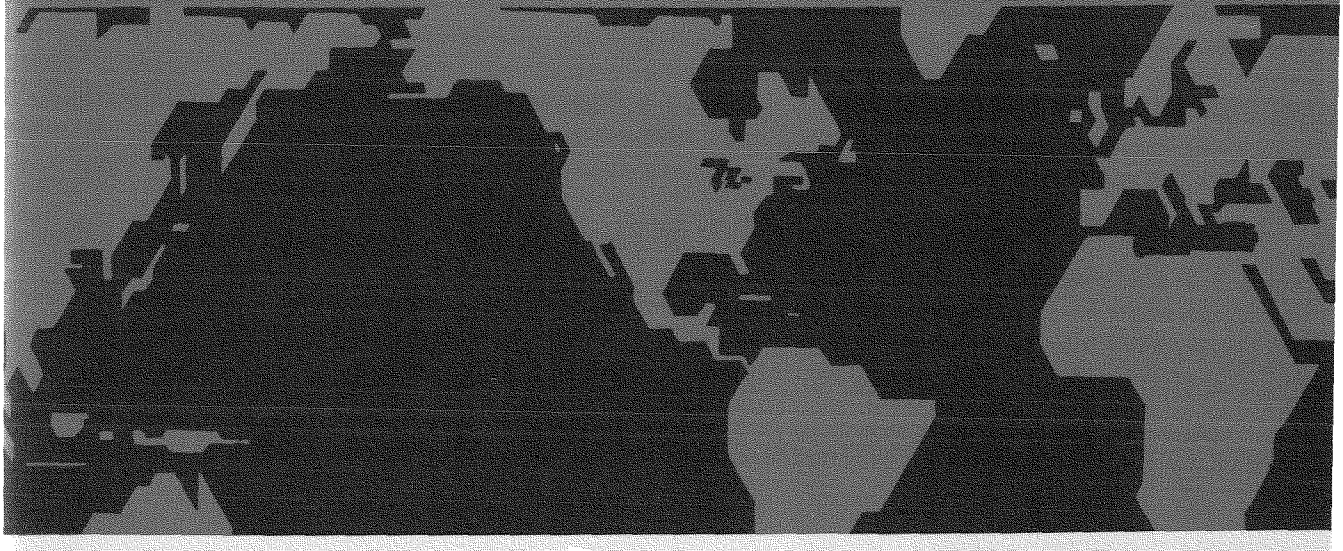
BUSINESS REVIEW

SPRING 1975

FEDERAL RESERVE BANK OF SAN FRANCISCO

WORLD INFLATION



P.O. Box 7702
San Francisco, Ca. 94120

The Interdependence of National Monetary Policies

Joseph Bisignano*

Of all commodities money is the most fungible. Consequently, the price of money—which is the rate of inflation — and the price of credit (money's liability counterpart) which is measured by interest rates—"tend" to similar values across domestic and international boundaries. With the increasing integration of domestic and international money and capital markets, it is unusual to see financial assets with similar risk characteristics trading at different interest yields for any length of time. A related, but different, result of money's fungibility is the fact that central bank monetary actions in one country can affect the money supply in another country under a system of imperfectly flexible exchange rates.

This article will outline some of the monetary interconnections among nations and specify in a simple fashion the results of these interrelations. We will first consider the degree of correlation among short - term interest rates of several countries. Next we will describe the composition of foreign monetary bases, and the connection of this composition to the monetary theory of the balance of payments. Finally we will consider the degree of impact of changes in the U.S. monetary base on changes in foreign money supplies, along with estimates of the demand for monetary-base money.

*I wish to thank Scott Nason for his research assistance.

Some obvious interdependencies

The rapid rise and integration of capital and money markets in the postwar period, combined with the spectacular growth of the Eurocurrency market since the early 1960's, have led to interrelated movements among financial assets of like maturity and risk elements. Table 1 presents a simple correlation matrix for the period 1959.1 to 1973.4, depicting the correlations among variout types of short-term interest rates—Treasury bill rates for eight countries as well as the three-month Eurodollar rate. The interest rates used are quarterly averages. In most cases we see very high correlation between foreign interest rates and the interest rate on U.S. Treasury bills. As we might expect, changes in U.S. and Canadian interest rates are highly correlated, but changes in U.S. and U.K. rates are equally highly correlated and the same is only slightly less true for rates in the U.S. and Germany.

There are a number of reasons for this close correlation. The most important is that in a world of relatively free capital markets assets denominated in different currencies serve as potential substitutes in the portfolios of private wealth-holders. In addition, countries may be pursuing similar monetary policies, which result in similar impacts on market-determined interest rates. Indeed, the balance of payments represents, in one definition, the change in a nation's international reserves, and domestic monetary policies are often undertaken in response to

changes in the balance of payments. The predominant reasons for this interrelationship among international interest rates include the growth of international capital markets and the relaxation of constraints on capital flows. In cases where governments have instituted domestic impediments to capital flows, international offsets to these impediments have then arisen, viz., the Eurocurrency market.

In addition to the interest-rate correlation, price indices also are correlated internationally. Because other countries formerly pegged their exchange rates to the dollar (within narrow bonds), any significant U.S. balance-of-payments deficits—caused, say, by an increase in price inflation within the U.S.—had to result in other countries purchasing dollars in the foreign-exchange markets. But, as we shall see below, such purchases of dollars added to the foreign-exchange reserves of foreign central banks. Table 2 displays the rapid upswing in official foreign-exchange holdings of eleven developed nations between 1968 and 1974. Germany and Japan, with their rapid real economic growth, experienced large demands for real money balances, which were at least partially satisfied through the accumulation of foreign-exchange reserves. The share of domestic money demand satisfied from foreign sources in a regime of fixed exchange rates depends upon the growth in the world money supply. (See the companion article by Shaw for details.) The U.S., as the major source of international reserves increased its dollar liabilities to foreign official institutions from $17 billion in 1968 to $71 billion in 1974. Because foreign-exchange reserves represent a major component of the monetary bases of foreign central banks, foreign money supplies necessarily had to expand, except where central banks could offset inflows of foreign-exchange reserves.

Composition of foreign monetary base

The money supply is similarly defined in this and most other countries. In the U.S., the narrowly defined money supply (M_1) is composed of currency and coin plus demand deposits held by the public. In the U.K., the M_1 money supply is composed of notes and coin plus sterling current accounts held by the public. However, the assets of the respective central banks—the Federal Reserve and the Bank of England—which support the reserves held by the commercial banks, are different in one important respect. The principal foreign component of this monetary base in the U.S. is the gold stock, while in the U.K. and other foreign countries the central bank's holdings of foreign assets make up a significant share of the sources of the monetary base. Since the money supply used by the public is "supported" by the central bank's monetary base, control of the monetary base is essential if a country is to control its money supply and its rate of inflation.

This simple point provides a monetary connection through the balance of payments to other

Table 1
Correlation Matrix
for Change in Eurodollar Rate and Treasury Bill Rate of Various Countries

	United States	United Kingdom	Canada	Italy	Germany	Japan	Australia	Netherlands	Euro
United States	1.000000								
United Kingdom	.801860	1.000000							
Canada	.788500	.599957	1.000000						
Italy	.471451	.395329	.122251	1.000000					
Germany	.645567	.545940	.299815	.632305	1.000000				
Japan	.334773	.200238	.624185	−.104926	.295214	1.000000			
Australia	.389175	.501618	.164727	.638102	.700282	.364275	1.000000		
Netherlands	.670903	.690429	.608011	.350920	.686181	.691753	.719916	1.000000	
Euro	.923835	.717829	.711332	.537490	.682429	.318161	.518629	.704486	1.000000

Note: Euro is the 3-month Euro-dollar rate. All other figures are the Treasury bill rates for the country indicated.

countries. Consider the assets of a foreign central bank, composed of domestic assets (e.g., government securities, loans to commercial banks) and foreign assets—which are counterbalanced by central bank liabilities, the equivalent in the U.S. of member-bank reserves, in some countries called "central bank money." Hence we have

$$(1) \qquad D + R = B$$

where D = domestic assets of the central bank,

R = foreign assets of the central bank (usually denominated in dollars)

B = monetary base of the central bank (central bank money).

The monetary base (B) is linked to the domestic money supply (M) by the relationship

$$(2) \qquad M = mB$$

where m is the money multiplier, which can be decomposed into its components which reflect financial preferences of the public and the banking system.

Consider a change in equation (1), that is

$$(3) \qquad \Delta D + \Delta R = \Delta B$$

or

$$(4) \qquad \Delta R = \Delta B - \Delta D$$

Table 2
Official Foreign Exchange Reserve Holdings and U.S. Official Liabilities
(Billions of U.S. Dollars: End of Period)

	1968	1969	1970	1971	1972	1973	1974
U.K.	0.9	1.1	1.2	5.1	4.1	4.7	4.9
Canada	2.0	1.8	3.0	4.1	4.4	3.9	3.8
Germany	3.9	2.7	8.5	12.6	17.2	25.1	24.0
Japan	2.3	2.6	3.2	13.8	16.5	10.2	11.3
France	0.3	0.3	1.3	3.6	5.1	3.7	3.8
Italy	1.5	1.2	2.1	3.0	2.2	2.2	3.2
Australia	0.9	0.7	1.1	2.7	5.4	4.9	3.6
Netherlands	0.3	0.4	0.8	0.4	1.4	3.3	3.5
Sweden	0.4	0.4	0.4	0.7	1.1	2.0	1.2
Norway	0.6	0.6	0.6	1.0	1.1	1.3	1.7
Denmark	0.2	0.3	0.4	0.5	0.6	1.0	0.6
U.S. Official Liabilities	17.3	16.0	23.8	50.7	57.5	69.6	70.8

Source: *International Financial Statistics*, various issues.

where Δ represents the incremental change in each variable. ΔR represents the change in a country's holdings of foreign-exchange reserves and corresponds to one definition of the balance of payments. Thus for a given time interval, say a quarter, ΔR would be the balance of payments in a given quarter, ΔB the change in the monetary base in that quarter and ΔD the change in domestic assets held by the central bank. If the monetary authorities have complete control over D, the domestic asset component of the monetary base—for example, through control over open market operations or lending to commercial banks—they may attempt to offset movements in the foreign-exchange-reserve component of the monetary base. This would obvi-

Table 3
Dependent Variable = Change in Domestic Assets
Sample Period = 1966-I – 1973-IV

Country	c	ΔForeign Assets	ϱ	$\bar{R}^2$	D.W.
U.K.	126.06	−1.1307	.4844	.8533	2.26
	(2.30)*	(−8.79)	(3.03)		
Canada	.1486	−1.0466	.5703	.8808	2.09
	(3.77)	(−15.1)	(2.80)		
Italy	315.17	−.60699	.2336	.2498	2.11
	(5.61)	(−2.65)	(1.32)		
Germany	1.0256	−.5906	.0784	.5823	1.98
	(1.64)	(−6.46)	(.431)		
Japan	626.97	−.87039	.9446	.9673	1.94
	(2.03)	(−24.6)	(15.8)		
France	2.1286	−.86465	−.3929	.2493	1.90
	(3.19)	(−3.58)	(−2.34)		
Australia	.090681	−.98522	.4475	.8943	2.04
	(3.13)	(−14.7)	(2.74)		
Netherlands	.08310	−.80451	−.5542	.8099	1.66
	(1.48)	(−9.59)	(−3.65)		
Sweden	.19822	−.87293	−.2509	.9099	1.82
	(7.98)	(−19.2)	(−1.42)		
Norway	.12940	−1.0010	−.2394	.7372	2.18
	(3.03)	(−8.59)	(−1.35)		
Denmark	.03127	−.8203	.1579	.5357	2.05
	(.299)	(−5.71)	(.8758)		

ϱ = serial correlation coefficient
D.W. = Durbin-Watson statistic
c = constant term
R^2 is adjusted for degrees of freedom.
*t—statistics in parentheses

ously imply a negative correlation between ΔD and ΔR.

The causal relation could work in the other direction. That is, capital flows may offset the conscious central bank decision regarding the desired change in D, the domestic component of the monetary base. Assume, for example, that the monetary authorities decide not to satisfy all the apparent demand for money. This would imply that the increase in the domestic component of the monetary base would be sufficient to satisfy only part of the demand for money, driving up domestic interest rates. The resulting increase in interest rate differentials, however, would cause the excess demand for money to be satisfied from abroad through an induced capital inflow and a balance of payments surplus. In this case the balance of payments would reflect the fact that domestic money demand exceeded domestic money supply. When the excess demand for money was satisfied the balance of payments would revert back to zero. Thus a negative relationship between ΔR and ΔD is consistent with either of the interpretations presented above.

Table 3 indicates that for the period 1966I to 1973IV, the change in the domestic component of the monetary base of eleven industrial countries was very significantly and negatively related to the movement in their foreign component. The overall goodness of fit in these simple regressions is generally very good, in most cases explaining over 70 percent of the variation in the change in the domestic component of the eleven foreign monetary bases. In several cases also, the coefficients on the change in the foreign-asset portion of the respective monetary bases are very close to unity. This gives the optimistic impression, if we take these regressions at face value, that foreign monetary authorities were able, within a quarter, to offset a very substantial portion of the change in their monetary bases induced by balance-of-payments movements. However if we reverse the relationship, explaining the change in the foreign component, we obtain very similar results, indicating that changes in the domestic component of the base give rise to offsetting

Table 4

Dependent Variable = ΔM (Change in Money Supply) Sample Period 1966-I – 1973-IV

Country	T-Bill Rate	ΔU.S. Base	DUM	SPEC	c	ϱ	$\bar{R}^2$	D.W.
U.K.	–80.8449	163.926	102.087	141.445	517.711	.0064	.5210	2.00
	(–4.46)	(2.51)	(.623)	(1.20)	(3.48)	(.035)		
Canada	–.1381	.4520	–.3127	–.597	.7018	–.2195	.4313	2.04
	(2.76)	(2.87)	(–.835)	(–2.48)	(1.78)	(–1.23)		
Italy	288.302	378.412	–300.803	511.224	–889.030	–.4089	.4675	2.18
	(3.86)	(1.50)	(–.728)	(1.30)	(–2.33)	(–2.45)		
Germany	–.4410	2.6359	1.4270	–3.3346	.8345	–.4174	.2035	2.06
	(–1.74)	(2.75)	(.494)	(–2.01)	(.538)	(–2.52)		
Japan	–554.445	118.114	–4705.2	213.613	3875.15	.5671	.8624	1.78
	(–2.17)	(.566)	(–11.029)	(.580)	(2.63)	(3.77)		
France**	(–.58895)	3.2251	8.7882	4.6724	4.5642	.00437	.2721	1.98
	(–1.18)	(2.15)	(2.13)	(1.30)	(.987)	(.024)		
Australia	–.02342	.01319	–.23557	.23268	.20845	.1621	.5342	1.85
	(–.783)	(.300)	(–2.66)	(2.84)	(1.56)	(.900)		
Netherlands	–.15157	.71778	–1.1637	–1.1910	.66528	–.2277	.5398	1.85
	(–2.12)	(3.69)	(–2.52)	(–3.75)	(1.40)	(–1.28)		
Sweden	–.009529	.096892	–.43853	.11949	.27643	–.5332	.2998	2.13
	(–4.52)	(1.17)	(–2.67)	(.736)	(1.42)	(–3.45)		
Norway**	.03212	.24352	—	.5515	–.1135	–.4110	.3875	2.46
	(1.19)	(2.83)	—	(2.56)	(–.453)	(–2.47)		
Denmark**	–.00904	.6601	—	.01617	.07305	–.2836	.0560	1.97
	(–.088)	(2.04)	—	(.020)	(.077)	(–1.62)		

**Interest rates = 3-mo. Euro. dollar rate.

movements in the foreign component. Thus, we cannot infer to what extent central banks were successful in offsetting foreign-exchange flows by simply observing the high correlation between the domestic and foreign components of the monetary base. We need additional information to determine the direction of causality.

If foreign central banks during the 1966-73 period were indeed capable of sterilizing foreign-exchange influences on their monetary bases, we should not expect changes in the monetary base of the United States, the country to which other countries pegged their exchange rate for much of the sample period, to strongly influence those foreign money supplies. Yet this is not the case. Table 4 relates the change in the money supplies of eleven industrial countries to their own short-term interest rate, the change in the U.S. monetary base (measured in U.S. dollars), a constant and several dummy variables.[1] The change in the U.S. monetary base is statistically significant in the majority of cases. U.S. monetary base changes should not be consistently significant for nations which were successful in repelling dollar inflows throughout this period, a period in which there was a sharp upward increase in the trend rate of growth in the U.S. monetary base.

Our results suggest that changes in the U.S. monetary base significantly influenced the money supplies of most major industrial countries except Japan. If the equations in Table 4 are appended to include changes in foreign as well as U.S. monetary bases, the U.S. base still remains significant. In several cases—the U.K., Canada, and France in particular—the foreign country's monetary base fails to be significantly significant (Table 5). These results would indicate that foreign countries were less than completely successful in sterilizing the foreign influence on their monetary bases and money supplies.

Table 5

Dependent Variable = ΔM (change in money supply) Sample Period 1966-I – 1973-IV

Country	ΔBase	$r_{T\text{-BILLS}}$	ΔU.S.* Base	DUM	SPEC	c	ϱ	$\bar{R}^2$	D.W.
U.K.	.0854	–84.43	155.12	141.263	130.941	543.992	–.019	.5023	2.01
	(.28)	(3.56)	(2.04)	(.63)	(1.07)	(2.85)	(–.107)		
Canada	1.0794	–.1307	.3618	–.0371	–.6314	.6237	–.336	.4468	2.13
	(1.43)	(2.84)	(2.16)	(.09)	(2.83)	(1.71)	(–1.95)		
Italy	1.5611	188.966	317.959	–487.583	377.916	–722.835	–.521	.6641	2.17
	(4.02)	(3.12)	(1.68)	(1.56)	(1.28)	(2.53)	(–3.35)		
Germany	.3944	–.3896	1.6937	2.0224	–4.00	1.0712	–.506	.4083	2.32
	(3.15)	(1.88)	(2.00)	(.83)	(2.91)	(.84)	(–3.21)		
Japan	1.0119	–453.401	123.333	–4753.77	94.4863	3014.66	.429	.8728	1.78
	(1.89)	(1.99)	(.61)	(11.35)	(.26)	(2.20)	(2.60)		
France**	–.10863	–.63288	2.9810	10.294	4.8985	5.3583	–.1229	.2544	2.03
	(–.763)	(–1.13)	(1.84)	(2.45)	(1.26)	(1.04)	(.678)		
Australia	.5351	–.0196	.0058	–.2103	.1829	.1579	–.057	.6509	2.04
	(3.20)	(.85)	(.17)	(2.67)	(2.69)	(1.57)	(–.312)		
Netherlands	.7161	–.1124	.6402	–.9163	–1.1661	.4525	.051	.8034	1.99
	(6.10)	(1.98)	(4.39)	(2.62)	(4.69)	(1.24)	(.277)		
Sweden	.60767	.003736	.03947	–.53809	.07778	.14435	–.5783	.3759	2.25
	(2.03)	(.183)	(.485)	(–3.41)	(.513)	(.758)	(–3.88)		
Norway**	.3976	.07349	.4218	—	–.2552	–.6275	–.038	.3211	2.23
	(1.68)	(2.94)	(3.88)	—	(–1.35)	(–2.49)	(–2.28)		
Denmark**	.2635	–.01434	.4568	—	.7267	.2805	–.041	.0839	2.16
	(.711)	(–.174)	(1.29)	—	(1.19)	(.337)	(–2.48)		

*U.S. Base measured in U.S. dollars.
**r = 3-mo. Euro-dollar rate.
SPEC = dummy variable for periods 1972IV-1973II.

It should not be surprising to find that changes in the U.S. monetary base were significant in explaining changes in foreign money supplies. Given the commitment by most nations to a system of fixed exchange rates, and given the continual rise in the rate of growth of the U.S. monetary base (from 2.0 percent in 1959-62 to 8.1 percent in 1973) it was not simply chance that most industrial nations experienced rapid increases in the rates of growth of their money supplies. The evidence seems to indicate that while these nations in the short run could sterilize some of the undesired increase in the monetary base induced via the balance of payments, they could not achieve long-run sterilization. Academic opinion also shifted during this period, bringing on a revival of primarily monetary interpretations of balance-of-payments phenomena. To that subject we now turn.

Money and the balance of payments

In its most rudimentary form, a monetary interpretation of the balance of payments requires a money demand equation, a money supply equation, an equation positing the equality of money demand and money supply (that is, money market equilibrium) and lastly, an equation defining the balance of payments as the change in the foreign asset component of the monetary base. The balance of payments, either through the flow of goods or the flow of capital, augments or diminishes the stock of foreign-exchange reserves of a nation, and hence the nation's monetary base. In equilibrium the demand for money must equal the supply, thus the balance of payments must also be zero. If the balance of payments is in surplus there must be excess demand for money; if it is in deficit, there is an excess supply of money. The balance of payments is the mechanism through which equality of money demand and supply is achieved.

The thing to be emphasized in this interpretation is that a non-zero balance of payments is a disequilibrium phenomenon. Variations in the balance of payments represent the flood gates through which equilibrium in the money market is restored. What then determines whether a country will have an excess demand or excess supply of money?

The functional components of the monetary base demand and supply determine the balance of payments and, simultaneously, the existence of excess demand or supply in the money market. Note that when we refer to "money" here we are referring to the monetary base. However, since money used by the public—say, demand deposits plus currency—is institutionally linked to the monetary base, our analysis implicitly concerns the excess demand and supply of money in the hands of the public.

Table 6
Dependent Variable = log (Monetary Base)
Sample Period = 1966-I – 1973-IV

	log y	log r	c	ϱ	$\bar{R}^2$	D.W.
U.S.	.8409	–.0424	–1.368	.2192	.9907	1.97
	(39.1)	(–3.00)	(–9.44)	(1.67)		
U.K.	.6692	.1880	.5616	.6270	.9628	1.88
	(9.78)	(4.54)	(.749)	(4.41)		
Canada	1.0625	–.0443	–3.0014	.8548	.9937	2.03
	(12.0)	(–1.87)	(–7.38)	(9.02)		
Italy	.2063	–.0441	7.6100	.9662	.9937	1.90
	(3.16)	(–1.04)	(9.94)	(20.5)		
Germany	1.3358	–.01758	–4.5014	.7901	.9793	2.31
	(8.33)	(–.348)	(–4.38)	(7.06)		
Japan	1.2418	.09842	–7.1474	.8155	.9975	2.25
	(21.5)	(1.34)	(–9.48)	(7.72)		
France	–.1085	.1135*	5.7253	.9740	.9503	2.00
	(–.784)	(1.95)	(5.22)	(23.5)		
Australia	1.0918	–.0544	–2.6408	.8136	.9902	1.84
	(11.4)	(–.874)	(–8.60)	(7.66)		
Netherlands	.4864	–.0690	.1567	.3483	.9625	2.03
	(17.3)	(–4.55)	(1.15)	(2.03)		
Sweden†	.7898	–.04780	–1.4830	.4014	.9766	1.73
	(17.7)	(–2.22)	(–6.87)	(2.06)		
Norway	.7592	–.0569*	–.00550	.2550	.9683	1.94
	(21.9)	(–2.39)	(–.056)	(1.41)		
Denmark	.1636	.09161*	1.0352	.8065	.7677	1.84
	(.807)	(1.10)	(1.06)	(7.47)		

†For period 1966.1-1971.4 r = domestic short-term interest rate
*3-mo. Euro-dollar rate y = aggregate output (GNP or GDP)

Base money demand can be simply stated as a function of aggregate income and some summary measure of interest rates. Base money supply is composed of a domestic credit component which is determined by the central bank, and a foreign asset component for the non-reserve center country. The domestic component of the monetary base may be thought of as the variable the monetary authorities control in order to influence domestic credit market conditions and the public's holdings of money. The primary means by which the monetary authorities control this domestic component vary from country to country, some using discount-rate policy, others open market operations or reserve requirements.

Consider an example where we begin with the equality of base money demand and supply. The balance of payments is zero. (Recall that we are assuming a world with imperfectly flexible exchange rates.) The central bank, desiring to achieve some income or interest rate or even balance-of-payments objective (the objective is of little significance), increases the domestic component of the monetary base. There now exists an excess supply of base money. The increase in base money, operating through central-bank domestic credit operations, will result in a fall in domestic interest rates and a rise in income generating a capital outflow and a trade deficit. The consequent decrease in international reserves will then offset the increase of domestic credit on the monetary base. When, after some period of time, equilibrium is restored to the money market, it will have been achieved through the avenue of the balance of payments. Indeed, the decline in the country's reserve holdings would be *exactly* equal to the conscious increase in the domestic component of the monetary base.

Ultimately, then, the money supply of the country under consideration does *not* change. However, what does increase is the *world money stock,* for now other countries hold the reserves that were lost by the domestic-credit-expanding nation.[2] A non-reserve center country can determine the composition of its monetary base, but its total monetary base and money supply are determined by their interactions with other countries—thus, its money supply becomes an endogenous variable, rather than a variable determined by the nation's own monetary authorities.[3]

Table 7
Tests of Stability Of Regression Coefficients for Monetary Base Demand Equations*

Country	F-statistic
U.S.	2.48
U.K.	2.96
Canada	7.74
Italy	3.71
Germany	3.34
Japan	7.63
France	4.98
Netherlands	2.66
Sweden	1.66
Norway	0.97
Denmark	2.28
Australia	3.07

*The critical value of the F-statistic at the 99% confidence level is 4.31 for all except Sweden.
Tests conducted by splitting sample pound in half and testing for statistical changes over the two sub-sample periods.

Monetary base demand

As we normally think of an aggregate demand for money by the public as a function of income, interest rates and other explanatory variables, we can similarly conceive of a demand for monetary base. The demand for monetary base money can be thought of as a "derived demand," in the sense that it derives from the demand for money held by the public. This derived demand for monetary base also relates to the stability of the multiplier connecting the monetary base to the money supply used by the public, this multiplier capturing a large number of money and reserve preferences of the public and the banking system.

The statistical validity of the monetary theory of the balance of payments depends crucially on the stability of its underlying behavioral equations—in its most rudimentary form, the demand and supply functions for monetary base. We will consider here only the demand for monetary

base. The demand for monetary base was specified as a function of the level of aggregate output (y)—GNP in most cases, gross domestic product (GDP) in others—and a representative short-term interest rate (r). A log-form demand equation was estimated for eleven countries, with the results appearing in Table 6. The results for Italy, France and Denmark were poor, in the sense that the coefficient on the income term was either extremely small, statistically insignificant, or both. However, these results should be discounted to some extent because we did not have quarterly GDP data for those and several other countries, so that quarterly data were generated by interpolating from annual regressions of GDP on retail sales and industrial production, weighted by prices.

For the remaining monetary base demand equations, we found that the coefficients on the income and interest-rate variable were not very different from those found for demand equations for money held by the public (demand deposits and currency). Income elasticities, measured by the coefficient on the aggregate-output variable, were in most cases between 0.75 and 1.25, about what would be expected a priori. The coefficient on the interest rate variable was generally negative (as expected) but positive and significant in the case of the U.K. For the majority of cases, the elasticity of base-money demand with respect to interest rates was relatively small, a result not atypical of those seen for the demand for money held by the public.

To test the stability of the monetary base demand equations, the sample period was divided evenly and separate regressions were estimated over these subsample periods. The conventional F-test for stability of the equation over the entire sample period was performed, as seen in Table 7. Regressions were also run using multiplicative and additive dummy variables in addition to the original explanatory variables, permitting us to test shifts in a particular coefficient. These latter regressions (not reported here) showed significant differences in the income elasticity of monetary base demand between the periods 1966-69 and 1970-73 for Canada, France, Germany, Japan and The Netherlands. In terms of the general F-test for stability, the hypothesis of stable demand equations over the entire period was rejected in the case of Canada, Japan and France.

While a number of qualifications can be made about the formulation of the base demand equations, and in particular about the quality of the data, the available evidence partially supports the hypothesis that monetary base demand equations remained stable over the 1966-73 period.[4] Monetary theories of the balance of payments are essentially theories of equilibrium restoration between money demand and supply in open economies. As we have seen, this analysis hinges crucially on the empirical stability of monetary-base demand. Our analysis *thus lends empirical support to monetary* interpretations of balance-of-payments phenomena.

Conclusion

The monetary theory of the balance of payments has revived interest in explaining balance of payments phenomena by concentrating on the means by which equilibrium between demand and supply for money is achieved under a system of less than perfectly floating exchange rates. In addition, it has emphasized the relationship between domestic credit creation by a central bank and the simultaneous creation of world money—those international reserves the domestic credit expanding country loses which are absorbed by the rest of the world. This paper concludes that there is some statistical evidence to support such interpretations.

FOOTNOTES

1. The dummy variable SPEC is unity for the period 1972.4-1973.2. The dummy variable DUM is different for different countries; for example, it is unity for the period of the French civil turmoil in 1968.2.
2. As Michael Keran has shown in his article, the world stock of foreign exchange reserves, one measure of a world money stock, contributed significantly to the increase in world prices in the last several years.
3. This point is developed in the companion article by Edward S. Shaw.
4. In most cases monetary-base data were obtained from the IMF'S *International Financial Statistics,* and were seasonally adjusted using the Census X-11 program.